

IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1 1-12. (Canceled)

1 13. (Currently Amended) A spin valve sensor comprising:

2 a first pinned layer having a first width and a first magnetic orientation;

3 a free layer, disposed above the first pinned layer and separated from the ~~first~~ first

4 pinned layer by a spacer, the free layer having a second width disposed above the first pinned
5 layer;

6 a ferromagnetic bias layer having the second width disposed above the free layer and a
7 second magnetic orientation orthogonal to the first magnetic orientation; and

8 an antiferromagnetic bias layer having the second width disposed above the

9 ferromagnetic bias layer, the ferromagnetic bias layer being exchange coupled to the

10 antiferromagnetic layer;

11 wherein the second width is smaller than the first width.

1 14. (Previously Presented) The spin valve sensor according to Claim 13,
2 further comprising:

3 a second pinned layer having a third magnetic orientation anti-parallel to the first
4 magnetic orientation; and

5 a coupling layer disposed between the first and second pinned layers.

1 15. (Previously Presented) The spin valve sensor according to Claim 14,
2 wherein a thickness of the first pinned layer is substantially equal to a thickness of the second
3 pinned layer.

1 16. (Previously Presented) The spin valve sensor according to Claim 15,
2 further comprising an anti-ferromagnetic (AFM) layer disposed adjacent to the first pinned
3 layer.

1 17. (Previously Presented) The spin valve sensor according to Claim 16,
2 wherein a thickness of the AFM layer establishes exchange coupling between the AFM layer
3 and the first pinned layer.

1 18. (Previously Presented) The spin valve sensor according to Claim 16,
2 wherein the first and second pinned layers are self-pinned.

1 19. (Currently Amended) A magnetic storage system, comprising:
2 a magnetic recording medium;
3 a spin valve sensor disposed proximate to the recording medium, the spin valve
4 sensor, including:
5 a first pinned layer having a first width and a first magnetic orientation;
6 a free layer, disposed above the first pinned layer and separated from the ~~first~~
7 first pinned layer by a spacer, the free layer having a second width disposed above the first
8 pinned layer;
9 a ferromagnetic biasing layer having the second width disposed above the free
10 layer and a second magnetic orientation orthogonal to the first magnetic orientation; and
11 an antiferromagnetic bias layer having the second width disposed above the
12 ferromagnetic bias layer, the ferromagnetic bias layer being exchange coupled to the
13 antiferromagnetic layer;
14 wherein the second width is smaller than the first width.

1 20. (Previously Presented) The magnetic storage system according to
2 Claim 19, further comprising:
3 a second pinned layer having a third magnetic orientation anti-parallel to the first
4 magnetic orientation; and
5 a coupling layer disposed between the first and second pinned layers.

1 21. (Previously Presented) The magnetic storage system according to
2 Claim 20, wherein a thickness of the first pinned layer is substantially equal to a thickness of
3 the second pinned layer.

1 22. (Previously Presented) The magnetic storage system according to
2 Claim 21, further comprising an anti-ferromagnetic (AFM) layer disposed adjacent to the
3 first pinned layer.

1 23. (Previously Presented) The magnetic storage system according to
2 Claim 22, wherein a thickness of the AFM layer establishes exchange coupling between the
3 AFM layer and the first pinned layer.

1 24. (Previously Presented) The magnetic storage system according to
2 Claim 22, wherein the first and second pinned layers are self-pinned.